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(54) COATING METHOD AND SILICON-CONTAINING LIQUID COMPOSITION

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a coating material requiring no primer coating, capable of improving coating film functions such as stain resistance and resistance to weathering only by coating directly on the surfaces of structures such as building structures and civil engineering structures or coating on the existing coating films.

SOLUTION: This coating method comprises applying a silicon-containing liquid composition obtained by formulating the following components A to D on the surface of a structure, and preventing the surface of the structure from staining. Component A: an organosilicate 100 pts.wt. calculated as SiO₂ Component B: catalyst 0.1-10 pts.wt., Component C: water 100-50,000 pts.wt., Component D: solvent 100-50,000 pts.wt.

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CLAIMS

[Claim(s)]

[Claim 1] The method of application which applies the silicon content liquefied constituent which comes to blend following component (A) - (D) on the surface of the structure, and prevents the dirt on the front face of the structure. (Component A) ORGANO silicate SiO_2 It is conversion and they are the 100 weight sections. Component (B) catalyst 0.1 - 10 weight section Component (C) water 100 - 50000 weight section Component (D) solvent 100 - 50000 weight section [claim 2] The method of application which applies the silicon content liquefied constituent which comes to blend following component (A) - (E) on the surface of the structure, and prevents the dirt on the front face of the structure.

(Component A) ORGANO silicate SiO_2 By conversion, the 100 weight sections A component (B) catalyst 0.1 - 10 weight section Component (C) water 100 - 50000 weight section Component (D) solvent 100 - 50000 weight section They are one or more sorts [claim 3] in a component (E) pigment, a filler, and the additive for coatings. Component (A) The method of application according to claim 1 which aerosol-izes the silicon content liquefied constituent which comes to blend - (D), and applies by spraying this on the surface of the structure.

[Claim 4] Component (A) The method of application according to claim 2 which aerosol-izes the silicon content liquefied constituent which comes to blend - (E), and applies by spraying this on the surface of the structure.

[Claim 5] Component (A) The method of application according to claim 1 which applies by wiping the silicon content liquefied constituent which comes to blend - (D) on the surface of the structure, applying it, and carrying out it.

[Claim 6] Component (A) The method of application according to claim 2 which applies by wiping the silicon content liquefied constituent which comes to blend - (E) on the surface of the structure, applying it, and carrying out it.

[Claim 7] Claims 1-6 whose components (A) are what is expressed with rational-formula SiO_x (OR) y are the method of application of a publication either. (However, it is $0 < x \leq 1.2$ and $1.4 < y \leq 4$, and R is the alkyl group of carbon numbers 1-4, and is $2 < x+y \leq 4$.)

[Claim 8] The method of application according to claim 1 to 7 whose ORGANO silicate is methyl silicate.

[Claim 9] The silicon content liquefied constituent which comes to blend following component (A) - (D).

(Component A) ORGANO silicate SiO_2 It is conversion and they are the 100 weight sections. Component (B) catalyst 0.1 - 10 weight section Component (C) water 100 - 50000 weight section Component (D) solvent 100 - 50000 weight section [claim 10] The silicon content liquefied constituent which comes to blend following component (A) - (E) on the surface of the structure.

(Component A) ORGANO silicate SiO_2 By conversion, the 100 weight sections A component (B) catalyst 0.1 - 10 weight section Component (C) water 100 - 50000 weight section Component (D) solvent 100 - 50000 weight section They are one or more sorts [claim 11] in a component (E) pigment, a filler, and the additive for coatings. The silicon content liquefied constituent according to claim 9 or 10 whose component (A) is what is expressed with rational-formula SiO_x (OR) y. (However, it is $0 < x \leq 1.2$ and $1.4 < y \leq 4$, and R is the alkyl group of carbon numbers 1-4, and is $2 < x+y \leq 4$.)

[Claim 12] The silicon content liquefied constituent according to claim 9 to 11 whose ORGANO silicate is methyl silicate.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention prevents the dirt produced in paint or the non-painted surface of a building construction, a soil tree structure object, an industrial device, a traffic sign, etc., such as dust and an oily component, or relates to the liquefied constituent with which adhering dirt is used for a method-of-application list easily removable by the rainfall, wiping, etc. suitable for such paint.

[0002]

[Description of the Prior Art] In recent years, importance is attached to scene nature, such as a building construction and a soil tree structure object, and various kinds of low stain resistance paint finishing aiming at the contamination-resistant improvement in a structure front face has come to be performed. As the approach of low stain resistance paint finishing, using high weatherability organic system coatings, such as a fluororesin system coating, an acrylic silicon system coating, and an urethane system coating, for finish (top coat) conventionally is performed.

[0003] Moreover, even when it is made hard to adhere dust and an oily pollutant and adheres to these coating systems in recent years by carrying out little addition of the alkyl silicate, and making a paint film front face into a hydrophilic property, what washes away with waterdrop by a rainfall etc. is performed. Development of the inorganic system coating which used as the principal component the organopolysiloxane which was generally excellent in weatherability, endurance, chemical resistance, thermal resistance, etc. on the other hand compared with the above mentioned organic system coating is also prosperous, and there are some which were made commercialization in recent years.

[0004] However, it is the structure etc. when painting such top coat (base material). It is the object which improves adhesion with a paint film more, and it is a problem common to an organic system coating and an inorganic system coating that it is the primer and the method of application with common using an intermediate coat if needed further, and takes time and effort between a base material and top coat. Moreover, lowering of scene nature tends to produce especially the paint film of an organic system coating that it is easy to be polluted in exposure with the effect of sand dust, a metal powder, rain (acid rain etc.), or exhaust gas.

[0005] Moreover, a problem tends to produce viscosity lifting at the time of coating preservation, the crack initiation in a paint film, etc. at paint film physical properties, and the top coat which carried out little addition of the alkyl silicate at these organic system coatings needs caution for handling and paint. Like [coating / inorganic / system] the organic system coating which carried out little addition of the alkyl silicate, the preservation stability of a coating, the crack initiation in a thick film, etc. have many which need heat hardening further, and the actual condition is having problems, like handling and paint taking caution.

[0006] Moreover, since these above-mentioned coating systems contain many volatile organic solvents, they correspond to the dangerous substance of Fire Service Law, and they need caution for dealing with it safely. The actual condition is the above stability of a coating material, a paint film function, and that problem solvings, such as workability at the time of paint and safety, are desired further.

[0007]

[Problem(s) to be Solved by the Invention] This invention does not need under coat paint, but only paints it on the direct or existing paint film on structure front faces, such as a building construction and a soil tree structure object, and aims at offering the coating material and the method of application which may improve paint film functions, such as resistance to contamination and weatherability.

[0008]

[Means for Solving the Problem] As a result of repeating examination wholeheartedly in view of the above-mentioned technical problem, this invention persons A building construction, a soil tree structure object, On paint of an industrial device, a transport-airplane machine, a traffic sign, etc., or the front face of the non-painting structure the specific silicon content constituent shown below — paper, cloth, a nonwoven fabric, etc. — sinking in — wiping — applying — or this silicon content constituent — aerosol — izing — the fuel spray and the paint film applied and obtained — dirt — prevention — or — even if a contamination should adhere — clearance — the easy thing was resulted in a header and this invention.

[0009] Namely, this invention (1) The method of application which applies the silicon content liquefied constituent which comes to blend following component (A) - (D) on the surface of the structure, and prevents the dirt on the front face of the structure, (Component A) ORGANO silicate SiO_2 By conversion, the 100 weight sections A component (B) catalyst 0.1 - 10 weight section Component (C) water The 100 - 50000 weight section A component (D) solvent 100 - 50000 weight section (2) The method of application which applies the silicon content liquefied constituent which comes to blend following component (A) - (E) on the surface of the structure, and prevents the dirt on the front face of the structure (Component A) ORGANO silicate SiO_2 By conversion, the 100 weight sections Component (B) catalyst 0.1 - 10 weight section Component (C) water 100 - 50000 weight section Component (D) solvent 100 - 50000 weight section. They are one or more sorts [0010] in a component (E) pigment, a filler, and the additive for coatings. (3) Component (A) the silicon content liquefied constituent which comes to blend - (D) The method of application given in the above (1) which aerosol-izes and applies by spraying this on the surface of the structure, (4) Component (A) the silicon content liquefied constituent which comes to blend - (E) The method of application given in the above (2) which aerosol-izes and applies by spraying this on the surface of the structure, (5) Above-mentioned (1) - (4) whose component (A) is what is expressed with rational-formula SiO_x (OR) y is the method of application (however, it is $0 \leq x \leq 1.2$ and $1.4 \leq y \leq 4$, and R is the alkyl group of carbon numbers 1-4, and is $2 \leq x+y \leq 4$.) of a publication either, (6) The method of

application given in either of above-mentioned (1) - (5) whose ORGANO silicate is methyl silicate, [0011] (7) The silicon content liquefied constituent which comes to blend following component (A) - (D), (Component A) ORGANO silicate SiO_2 By conversion, the 100 weight sections A component (B) catalyst 0.1 - 10 weight section Component (C) water The 100 - 50000 weight section A component (D) solvent 100 - 50000 weight section (8) The silicon content liquefied constituent which comes to blend following component (A) - (E) on the surface of the structure, (Component A) ORGANO silicate SiO_2 By conversion, the 100 weight sections Component (B) catalyst 0.1 - 10 weight section Component (C) water 100 - 50000 weight section Component (D) solvent 100 - 50000 weight section They are one or more sorts [0012] in a component (E) pigment, a filler, and the additive for coatings. (9) The above (7) whose component (A) is what is expressed with rational-formula SiO_x (OR) y, or a silicon content liquefied constituent given in (8) (however, it is $0 < x \leq 1.2$ and $1.4 \leq y \leq 4$, and R is the alkyl group of carbon numbers 1-4, and is $2x + y = 4$), (10) ORGANO silicate consists in a silicon content liquefied constituent given in either of above-mentioned (7) - (9) which is methyl silicate.

[0013] It applied to the non-painting structure front face directly, or it became possible only by painting a specific silicon content liquefied constituent on the existing paint film on the painted front face of the structure by this invention to raise paint film functions, such as resistance to contamination and weatherability. A paint film function can also be further improved by having blended various additives for coatings, such as a pigment, a bulking agent and/or a dripping inhibitor, a leveling agent, a HAJIKI inhibitor, an adhesion improver, a seaweed-proofing agent, an antimicrobial agent, a deodorizer, and an ultraviolet ray absorbent, etc. especially as a silicon content liquefied constituent.

[0014]

[Embodiment of the Invention] In this invention, component (A) - (D) explained below or the thing which blended the component (E) further and was used as the liquefied constituent is used. A component (A) is the compound which the organic radical combined with ORGANO silicate, i.e., a silicon atom, through the oxygen atom first. ORGANO KISHISHIRAN which four organic radicals combined with one silicon atom through the oxygen atom as ORGANO silicate, and the ORUGANOKISHI siloxane in which silicon forms the siloxane principal chain (Si-O) (n) are mentioned.

[0015] especially the organic radical combined with silicon through an oxygen atom is limited — not having — for example, the shape of a straight chain, the letter of branching, or an annular alkyl group — methyl, ethyl, n-propyl, i-propyl, n-butyl, i-butyl, t-butyl, n-pentyl, i-pentyl, neopentyl one, hexyl, an octyl radical, etc. are more specifically mentioned, and especially the alkyl group of carbon numbers 1-4 is suitable. As other organic radicals, an aryl group, a xylyl group, a naphthyl group, etc. are mentioned. Moreover, you may have two or more sorts of radicals which are different from each other as an organic radical.

[0016] As an alkyl group, although the thing of carbon numbers 1-4 is desirable, it is any of the shape of a straight chain, and the letter of branching, and a peach is good, for example, a methyl group, an ethyl group, n-propyl group, i-propyl group, n-butyl, i-butyl, sec-butyl, t-butyl, etc. are mentioned, and the complex and/or mixture of these radicals can also be used. You may have two or more sorts of alkyl groups which are different from each other as an alkyl group. A field to the methyl group and/or ethyl group of the solubility at the time of considering as the silicon content constituent of this invention among these alkyl groups and the manifestation nature of the low stain resistance function of the paint film obtained are desirable, and a methyl group is the most desirable.

[0017] In the case of an alkyl group to which a carbon number exceeds 4, when considering as the silicon content constituent of this invention, since solubility is low, an organic solvent is needed for a large quantity, and the problem on handling, such as corresponding to the dangerous substance of Fire Service Law, occurs in many cases. Moreover, the alkyl group to which a carbon number exceeds 4 is lacking in hydrolysis nature, generation of the SiOH radical in the outdoor exposure of the paint film obtained becomes it is remarkable and slow, and a scarce inclination is in the manifestation nature of a low stain resistance function.

[0018] As ORGANO KISHISHIRAN, a tetramethoxy silane, a tetra-ethoxy silane, tetra-propoxysilane, tetra-butoxysilane, a tetra-phenoxy silane, dimethoxy diethoxysilane, etc. are mentioned, for example. The condensate of above-mentioned ORGANO KISHISHIRAN is mentioned as an ORUGANOKISHI siloxane. Although especially whenever [condensation] is not limited, what is shown by the following rational formulas as desirable range is mentioned.

[0019] SiO_x (OR) y (it is $0 < x \leq 1.2$ and $1.4 \leq y \leq 4$ among a formula, and R is an organic radical.) R is the alkyl group of carbon numbers 1-4 preferably. However, it is $2x + y = 4$.

[0020] Although a multiplier x shows whenever [condensation / of a siloxane], when a siloxane has molecular weight distribution, it means whenever [average condensation]. $x = 0$ expresses ORGANO KISHISHIRAN which is a monomer, and $0 < x < 2$ corresponds to the oligomer which is a condensate exceeding the monomer obtained by carrying out partial hydrolysis condensation of this. $x = 2$ corresponds to SiO_2 (silica). Whenever [condensation / of the ORGANO silicate used by this invention], the range of x of $0 < x \leq 1.2$ is desirable, and it is $0 < x \leq 1.0$ more preferably. Moreover, a siloxane principal chain may not ask the shape of a straight chain, branching, and annular, and may be such mixture.

[0021] Whenever [condensation] is the amount of macromolecules highly, and since it is lacking in stability, the ORGANO silicate of $x > 1.2$ is [that it is easy to gel viscosity highly at the time of storage] difficult to use it. Moreover, since the solubility to an organic solvent is low, it is easy to generate the problem on handling — in case the silicon content constituent of this invention is prepared, need an organic solvent for a large quantity, and the constituent obtained corresponds to the dangerous substance of Fire Service Law.

[0022] In addition, a rational formula SiO_x (OR) can be searched for by the following approaches. Whenever [condensation]: x can be easily known by measuring Si-NMR. the chemical shift value of a tetramethylsilane (primary standard) — 0 ppm — carrying out — the case of ORGANO silicate — between a chemical shift value and -75—120ppm — the peak of five groups — giving — respectively — Q0, Q1, Q2, Q3, and Q4 ** — it calls. Each peak originates in the number of siloxane association which a silicon atom has, and is Q0. The number of siloxane association is the monomer of 0, and Q1. The number of siloxane association is one and Q2. The number of siloxanes is two and Q3. The number of siloxane association is three and Q4. The number of siloxane association expresses four objects. :x can be found whenever [condensation] by asking for the surface ratio of each of these peaks, and calculating according to the following formulas. In the case of a silica (SiO_2), it is set to $x = 2$.

$x = \text{Ax}0 + \text{Bx}0.5 + \text{Cx}1.0 + \text{Dx}1.5 + \text{Ex}2\text{Q0, Q1, Q2, Q3, and Q4}$ Each surface ratio is made into A:B:C:D:E. However, it is $\text{A} + \text{B} + \text{C} + \text{D} + \text{E} = 1$. The multiplier y in a rational formula is called for from $2x + y = 4$. in addition — as an organic radical — difference — when it has two or more sorts of radicals and calculates the amount of association of each organic radical, it can ask easily from H-NMR or ^{13}C -NMR. In this case, identification of a chemical shift should just choose

an easy approach suitably.

[0023] As a desirable example of the ORGANO silicate used by above-mentioned this invention, a tetramethoxy silane, a tetra-ethoxy silane, tetra-n-propoxysilane, tetra-isopropoxysilane, tetra-n-butoxysilane, tetrapod iso butoxysilane, tetra-sec-butoxysilane, tetra-t-butoxysilane, and/or these partial hydrolysis condensates are mentioned, for example. These things can also use one sort or the thing combined two or more sorts. Since there is little organic solvent **** used for preparing a uniform liquefied constituent, and it ends among these ORGANO silicate from a tetramethoxy silane and/or this partial hydrolysis condensate being high, and hydrolysis reactivity tending to generate a silanol group, and it does not correspond to the dangerous substance but the pollution-control effectiveness can obtain a high constituent easily, it is suitable in order to raise especially safety.

[0024] In addition, although the organic radical is combined with silicon through oxygen in ORGANO silicate, in the silicon content constituent of this invention, organic silicon compounds other than ORGANO silicate, for example, the silicon compound which has the organic radical coupled directly through silicon, may be included. As such a compound, various kinds of silane coupling agents etc., for example more specifically Methyl trimethoxysilane, methyl triethoxysilane, a methyl tripropoxy silane, A methyl triisopropoxy silane, ethyltrimethoxysilane, ethyltriethoxysilane, An ethyl tripropoxy silane, an ethyl triisopropoxy silane, propyltrimethoxysilane, Propyl triethoxysilane, butyltrimethoxysilane, epoxybutyltriethoxysilane, Pentyl trimethoxysilane, pentyl triethoxysilane, hexyl trimethoxysilane, Hexyl triethoxysilane, phenyltrimethoxysilane, phenyltriethoxysilane, A phenyl tripropoxy silane, a phenyl triisopropoxy silane, Benzyl trimethoxysilane, benzyl triethoxysilane, 3-glycidoxypropyltrimethoxysilane, 3-glycidoxypropyltriethoxysilane, 2-(3, 4-epoxycyclohexyl) ethyltrimethoxysilane, 2-(3, 4-epoxycyclohexyl) ethyltriethoxysilane, 3-methacryloxy propyl trimethoxysilane, 3-methacryloxypropyl triethoxysilane, Vinyltrimethoxysilane, vinyltriethoxysilane, 3-mercapto propyltrimethoxysilane, 3-mercapto propyl triethoxysilane, 3-aminopropyl triethoxysilane, Trialkoxysilane compounds, such as N-(2-aminoethyl)-3-aminopropyl trimethoxysilane and 3-ureido propyl triethoxysilane, and these partial hydrolysis condensates are mentioned.

[0025] Furthermore, dialkoxysilane compounds, such as dimethyldimethoxysilane, dimethyl diethoxysilane, diethyldimethoxysilane, diethyldiethoxysilane, diphenyldimethoxysilane, diphenyl diethoxysilane, 3-glycidoxypropylmethyldimethoxysilane, 3-methacryloxy propyl methyl dimethoxysilane, 3-mercapto propylmethyl dimethoxysilane, 3-aminopropyl methyl JITOKISHI silane, and N-(2-aminoethyl)-3-aminopropyl methyl dimethoxysilane, and these partial hydrolysis condensates are mentioned.

[0026] Furthermore, chlorosilane compounds, such as methyltrichlorosilane, vinyl trichlorosilane, phenyl trichlorosilane, methyl dichlorosilane, dimethyldichlorosilane, dimethyl chlorosilane, methylvinyl dichlorosilane, 3-chloropropyl methyl dichlorosilane, diphenyl dichlorosilane, and methylphenyl dichlorosilane, and these partial hydrolysis condensates are mentioned.

[0027] Furthermore, 3-mercapto propyltrimethoxysilane, 3-mercapto propylmethyl dimethoxysilane, 3-mercapto propyl triethoxysilane, 3-mercapto propylmethyl diethoxysilane, 3-aminopropyl trimethoxysilane, 3-aminopropyl triethoxysilane, N-3-trimethoxysilylpropyl-m-phenylenediamine, N, and N-bis[3-(methyl dimethoxy silyl) propyl] ethylenediamine, N and N-bis[3-(trimethoxysilyl) propyl] ethylenediamine, N-(2-aminoethyl)-3-aminopropyl methyl dimethoxysilane, N-(2-aminoethyl)-3-aminopropyl trimethoxysilane, P-[N-(2-aminoethyl) aminomethyl] phenethyl trimethoxysilane, etc. are mentioned.

[0028] It is ORGANO silicate which is the (A) component in this case although these organic silicon compounds may be included in the silicon content constituent of this invention SiO₂ It carries out to below 10 weight sections more preferably below 25 weight sections to the 100 weight sections by conversion. Organic silicon compounds other than such ORGANO silicate are because there are few amounts of functional groups which can be hydrolyzed as compared with ORGANO silicate, and the degree which contributes to a pollution control is remarkable and low. Of course, such a compound does not need to be included at all. Moreover, although the silicon compound in which the functional group in which the hydrolysis of those other than an ORUGANOKISHI radical is possible, for example, various kinds of halogens etc., was made to exist may be made to exist, since hydrolysis may generate the matter with the difficult handling of a hydrochloric acid etc., many are ORGANO silicate desirably on an environment SiO₂ It carries out to below 10 weight sections more preferably below 20 weight sections to the 100 weight sections by conversion. Of course, such a compound does not need to be included at all.

[0029] A component (B) is a catalyst and what has a hydrolysis operation of ORGANO silicate is mentioned. They are more specifically inorganic acids, such as a hydrochloric acid, a sulfuric acid, a nitric acid, and a phosphoric acid. Organic acids, such as an acetic acid, benzenesulfonic acid, toluenesulfonic acid, a xylene sulfonic acid, an ethylbenzene sulfonic acid, a benzoic acid, a phthalic acid, a maleic acid, a formic acid, and oxalic acid. Alkali catalysts, such as a sodium hydroxide, a potassium hydroxide, a calcium hydroxide, ammonia, and an organic amine compound. Organotin compounds, such as dibutyltin dilaurate, dibutyltin JIOKUCHIETO, and dibutyltin diacetate, Aluminum tris (acetylacetonate), an aluminum monoacetyl acetonate screw (ethyl acetoacetate), Organoaluminium compounds, such as aluminum tris (ethyl acetoacetate) and ethyl acetoacetate aluminum JISOPUROIPIRETO, Titanium tetrakis (acetylacetonate), a titanium bis(butoxy) screw (acetylacetonate), Organic titanium compounds, such as titanium tetra-n-butoxide, zirconium tetrakis (cetyl acetonate), A zirconium bis(butoxy) screw (acetylacetonate) and a zirconium (isopropoxy) screw (acetylacetonate), The organometallic compound or metal alkoxide compounds other than ORGANO silicate, such as organic zirconium compounds, such as zirconium tetra-n-butoxide. Boron compounds, such as BORONTORI n-butoxide and a boric acid, etc. are mentioned.

[0030] One sort or the thing combined two or more sorts can also be used for these catalysts. When applying the silicon content constituent of this invention to paint of a building construction, a soil tree structure object, an industrial device, a transport-airplane machine, a traffic sign, etc., or the front face of the non-painting structure, from the point of the corrosion prevention of the base material by these catalysts, it is desirable to use an organic metal chelate compound or a metal alkoxide compound.

[0031] The addition of a catalyst is the amount of Si in ORGANO silicate SiO₂ It converts and is 0.1 - 10 weight section to the 100 weight sections. It is 0.5 - 5 weight section more preferably. When the amount of catalysts considers as the silicon content constituent of this invention under in the 0.1 weight section, it is lacking in the manifestation nature of the low stain resistance function of the paint film which lowering of the storage stability of a constituent arises or is obtained. Moreover, 0.1 - 10 weight section is enough as the addition of a catalyst from the storage stability of a silicon content constituent, and the manifestation nature of a paint film function, and it is unnecessary in the superfluous addition exceeding 10 weight sections. It may dissolve in ORGANO silicate and the

addition approach of a catalyst may be used as mixed liquor, and even if it dissolves and uses for water or a solvent, it does not interfere. That what is necessary is to mix with ORGANO silicate and/or water, or a solvent, and just to dissolve under a room temperature on the occasion of the dissolution, as long as it is hard to dissolve under a room temperature, you may warm.

[0032] The loadings of the water which is Component C are the amount of Si in ORGANO silicate SiO_2 . It converts and is the 100 – 50000 weight section to the 100 weight sections. It considers as the range of the 500 – 10000 weight section preferably. the theory which may hydrolyze the ORUGANOKISHI radical on which ORGANO silicate generally has this — the water of the amount of an overlarge will be blended rather than amount of water, by this, the silanol group generated by hydrolysis of ORGANO silicate is made to coexist with a lot of water, the condensation reaction of a silanol group is controlled, and it is thought that improvement in the storage stability of hydrolysis liquid is attained. Simultaneously, it becomes possible to be able to lower the blending ratio of coal of organic solvents, such as alcohol as a constituent, and to stop the flash point and the burning point low, and the safety on an activity improves greatly.

[0033] The addition of water is the amount of Si in ORGANO silicate SiO_2 . When Si content in the silicon content constituent which converts and is obtained the case of under the 100 weight sections to the 100 weight sections becomes high too much, it is easy to gel at the time of preservation and storage stability poses a problem from the field of practicability, the pollution-control effectiveness is also low. There are too few Si contents in the silicon content constituent obtained on the other hand if the 50000 weight sections are exceeded, and the manifestation nature of the low stain resistance function when making it a paint film is scarce.

[0034] What is necessary is just to choose suitably, since it is sometimes desirable to use deionized water and ultrapure water depending on the object and an application although especially a limit may not be in the water used by this invention and tap water is sufficient. For example, when using for electrical and electric equipment, such as base materials, such as mild steel which is easy to corrode especially with an acid, copper, and aluminum, a heat-resistant coat, a damp-proof coat, a chemical-resistant coat, a barrier property-proof coat, and an electric insulation coat, and an electronic ingredient application, desalted water can be used, or like the application of a semi-conductor etc., when mixing of an impurity is not desirable, ultrapure water can be used.

[0035] Especially the solvent of Component D is not limited. Generally one sort or two sorts or more in various kinds of organic solvents, for example, alcohols, or a glycol derivative, hydrocarbons, ester, ketones, and ether can be mixed and used. As alcohols, a methanol, ethanol, n-propanol, isopropanol, n-butanol, isobutanol, acetylacetone alcohol, etc. are mentioned.

[0036] As a glycol derivative, for example, ethylene glycol, ethylene glycol monomethyl ether, Ethylene glycol monoethyl ether, propylene glycol, propylene glycol monomethyl ether, The propylene glycol monoethyl ether, the diethylene-glycol monomethyl ether, Diethylene glycol monoethyl ether, ethylene glycol monomethyl ether acetate, Ethylene glycol monoethyl ether acetate, propylene-glycol-monomethyl-ether acetate, propylene glycol monoethyl ether acetate, etc. are mentioned.

[0037] Benzene, toluene, a xylene, kerosine, n-hexane, etc. can be used as hydrocarbons, and methyl acetate, ethyl acetate, propyl acetate, butyl acetate, methyl acetoacetate, an ethyl acetoacetate, butyl acetoacetate, etc. can be used as ester. Moreover, as ketones, an acetone, a methyl ethyl ketone, methyl isobutyl ketone, an acetylacetone, etc. can be used, and ethyl ether, butyl ether, methoxy ethanol, ethoxy ethanol, dioxane, a furan, a tetrahydrofuran, etc. can be used as ether. It is desirable from the field of the manifestation nature of the low stain resistance function of the paint film obtained among these solvents while the storage stability at the time of the methanol of C1-C3, ethanol, isopropanol, the propylene glycol monomethyl ether of a glycol derivative, and diethylene glycol monoethyl ether being especially easy for handling, and considering as the silicon content constituent of this invention of alcohols is good.

[0038] The addition of a solvent is the amount of Si in ORGANO silicate SiO_2 . It converts and considers as the 100 – 50000 weight section to the 100 weight sections. It sets up in the range of the 500 – 10000 weight section more preferably. The addition of an organic solvent is the amount of Si in ORGANO silicate SiO_2 . It converts and the homogeneity dissolution of ORGANO silicate, a catalyst, and water becomes difficult the case of under the 100 weight sections to the 100 weight sections. While the manifestation nature of a low stain resistance function when there are too few Si contents in the silicon content constituent obtained on the other hand if the 50000 weight sections are exceeded and they make it a paint film is scarce, it corresponds to the dangerous substance of Fire Service Law, and the problem on handling is produced. In addition, the amount of a solvent also including the alcohol which ORGANO silicate hydrolyzed and generated shows the above.

[0039] (The combination approach of a silicon content constituent) As for the combination approach of the silicon content constituent of this invention, it is [that what is necessary is to be presentation within the limits of this invention, and just to carry out homogeneity mixing of the component (A) mentioned above, (B), (C), and the (D)] desirable to become transparent liquid, and especially the temperature and the mixed approach at the time of combination are not limited. Room temperature extent is especially enough and it is not necessary to heat. For example, using mixed containers, such as a mixing chamber, a mixed iron pot or a mixer, a drum, and an oil can, component (A) – (D) is serially taught under a room temperature, mixed actuation of stirring or a revolution, reversal, an oscillation, etc. is performed, and it is good also as a silicon content constituent transparent 1 liquid type [uniform]. Moreover, it is good also as a silicon content constituent used as a combination gestalt of the 2 liquid type which divides into base resin and a curing agent, and mixes and uses base resin and a curing agent before an activity, for example, good in base resin also considering alkyl silicate, the mixture of a catalyst, and a curing agent as mixture of water and an organic solvent in using base resin as alkyl silicate and using a curing agent as the mixture of a catalyst, water, and an organic solvent. A these 2 liquid type gestalt is not limited to the above-mentioned thing which carried out the account of an example.

[0040] In this invention, pigments, such as a color pigment which can be blended with the usual coating as a component (E), and an extender, a filler, and various kinds of other additives can be blended. What is necessary is just to choose especially an addition suitably with extent which is not limited and generally does not influence the effectiveness of this invention. As an additive of a component (E), organic pigments, such as inorganic system pigments, such as titanium oxide, a zinc oxide, carbon black, ferric oxide (red ochre), a lead chromate, the chrome yellow, Synthetic Ochre, ochre, ultramarine blue, and cobalt green, an azo system, a naphthol system, a pyrazolone system, an anthraquinone system, a perylene system, the Quinacridone system, a JISUAZO system, an isoindolinone system, a benzimidazole system, a phthalocyanine system, and a kino FUTARON system, etc. are mentioned with a color pigment, for example. Moreover, it is also possible to use extenders, such as whitening, clay, a kaolin, talc, precipitated barium sulphate, a barium

carbonate, white carbon, and diatomaceous earth.

[0041] As various additives, it is still more possible a pigment agent, a sedimentation inhibitor, and to hang down and for an inhibitor, a flattening, a plasticizer, a defoaming agent, a leveling agent, a HAJIKI inhibitor, an adhesion improver, antiseptics, a seaweed-proofing agent, an antimicrobial agent, a deodorizer, an ultraviolet ray absorbent, etc. to be mentioned, and to use it, carrying out little addition. although there will be especially no limit if the loadings of these additives are an addition which the effectiveness of the additive made into the object discovers — the silicon content constituent 100 weight section of this invention — receiving — the 0.01 – 10.0 weight section — it comes out enough with the addition of the 0.01 – 1.0 weight section preferably.

[0042] the combination approach of a component (E) is limited — not having — component (A) – (D) — all may be blended, and you may add to the silicon content constituent liquefied one time, and may add and use for each components, such as alkyl silicate which dissolves or is easy to distribute, water, and an organic solvent. Moreover, it divides into base resin and a curing agent, and in the case of the silicon content constituent used as a combination gestalt of the 2 liquid type which mixes and uses base resin and a curing agent before an activity, it blends for any of base resin or a curing agent being, and it should just use a component (E).

[0043] Each above component can be blended and the silicon content constituent of this invention can be obtained. The concentration of the ORGANO silicate in this silicon content constituent is the amount of Si in ORGANO silicate SiO_2 . It converts and 0.05 – 15 % of the weight is 0.1 – 10 % of the weight desirable still more preferably. The concentration of ORGANO silicate is SiO_2 . The manifestation nature of the low stain resistance function at the time of the concentration being low and applying to paint of a building construction, a soil tree structure object, an industrial device, a transport-airplane machine, a traffic sign, etc. or the front face of the non-painting structure at less than 0.05 % of the weight, with conversion concentration, is scarce. On the other hand, the concentration of alkyl silicate is SiO_2 . Since the concentration of what exceeds 15 % of the weight by conversion concentration is high, a silicon content constituent tends to gel it at the time of preservation, and it is in the inclination for storage stability to pose a problem from the field of practicability.

[0044] (Method of application) It is possible to wipe [sink it in and] and apply the silicon content constituent of this invention to paper, cloth, a nonwoven fabric, etc., or to aerosol-ize it on a paint front face or non-painting front faces, such as a building construction, a soil tree structure object, an industrial device, a transport-airplane machine, and a traffic sign, and to apply by simple approaches, such as fuel-spray spreading. It is also possible to apply, of course by various approaches, such as the usual brush coating, roller coating, spray coating, a roll coater, and a flow coater.

[0045] the structures set as the spreading object of the silicon content constituent of this invention be the outdoor structures, such as transport airplane machines, such as cultural properties, such as building constructions, such as soil tree structure objects, such as a tunnel, a dam, a bridge, a tank, and a chimney stack, a residence, and a building, a temple, a shrine, a stone image, and ruins, an automobile, an aircraft, a rail car, and a marine vessel, an industrial device, a traffic sign, and a guard rail, and be the structure which have perform the existing paint to these, or the non-paint structure as a concrete spreading side — for example — the wall surface of the exterior of said structure and the inner surface (an outer wall, wall), the bath of a building construction, and a galley — further — dirt, such as tank sides, such as furniture, a refrigerator, television, and an air-conditioner, and a windowpane, — being easy — a location is mentioned. In addition, the location which can apply the silicon content constituent of this invention is usable not only in the location which carried out the account of an example but various locations because of dirt prevention.

[0046] The 1st approach of the simple method of application of this invention is the approach of paper, cloth, a nonwoven fabric, etc. sinking the silicon content constituent of this invention into the medium which can sink in the silicon content liquefied constituent of this invention, extracting this moderately if needed, and wiping, applying and using as a paint object front face. Moreover, the 2nd approach aerosol-izes the silicon content constituent of this invention, and is the fuel spray and the approach of applying on a structure front face.

[0047] Either the approach of making carry out impregnation of the silicon content constituent of this invention to paper, cloth, a nonwoven fabric, etc. beforehand, saving it in the well-closed container by the 1st approach, taking out from a container if needed, and wiping, applying and carrying out a structure front face or the approach of dipping out paper, cloth, a nonwoven fabric, etc. in the silicon content constituent of this invention at the time of an activity, extracting moderately, wiping a structure front face, applying, and carrying out is possible. By a structure front face being able to apply an established paint film or un-painting simply also by the new paint film, and wiping with this approach, since it is coating, dripping is not produced. Moreover, since the dirt which wiped, and applied, simultaneously has already adhered can be wiped off, even if it does not wash a structure front face beforehand, it can apply.

[0048] With propellants, the silicon content constituent of this invention is filled up with the 2nd approach into an aerosol can, and is aerosol-ized by it. it is possible to use well-known propellants as propellants, for example, independent in wood ether, LP gas, etc. — or it can be mixed and used. This aerosol ghost can be used for the same structure front face as the 1st approach, and that method of application can paint a direct aerosol ghost easily by carrying out fuel-spray spreading on a structure front face. In addition, when carrying out fuel-spray spreading of the aerosol ghost on the paint film front face of the established structure and non-painting object front face to which dirt has already adhered, pretreatment of washing a front face beforehand and removing dirt is desirable. It is possible to, carry out fuel-spray spreading of the direct aerosol ghost on the other hand, without washing, when there is no adhesion of dirt like structure front faces, such as a new construction paint film and touch-up film, or the non-painting new construction structure. In this case, even if it has not dried a new construction paint film, the touch-up film, or a non-painting new construction structure front face, it is possible to carry out fuel-spray spreading of the aerosol ghost.

[0049] Thus, the thin film formation which may improve paint film functions which present the good paint result which applies to various structure front faces and does not have nonuniformity, dripping, a crack, etc. by the simple method of application using the silicon content constituent of this invention, such as resistance to contamination and weatherability, is attained. The silicon content liquefied constituent of this invention explained above is possible also for holding down the amount of organic solvents, such as alcohol, to the top which can be saved by liquefied voice at stability, and not corresponding to the dangerous substance on Fire Service Law in it, either, and desirable also from a viewpoint of the insurance on an activity. This is considered because the balance of the quantitative ratio of each combination component is kept good.

[0050]

[Example] Hereafter, an example explains this invention to a detail further. In addition, especially, % shows weight %, as long as there is no notice.

[0051] (Example 1 of preparation) Using the partial hydrolysis condensate (Mitsubishi Chemical make: trade name "MKC silicate MS 51" rational-formula: $\text{SiO}_0.8 \text{ 2.4 (OCH}_3\text{)}$) of methyl silicate, it mixed for room temperature 20 minutes by the following blending ratio of coal, and the "silicon content constituent -1" of transparent and colorless liquid was prepared.

MS51 100 Weight section (SiO_2 conversion)

8% solution of aluminum system catalysts 1.8 Weight section Industrial use ethanol 5385 Weight section Ion exchange water 7500 SiO_2 in the liquid of weight **** A conversion content is 0.8wt%.

[0052] The dangerous-substance judging of this the "silicon content constituent -1" was performed according to the test method for the dangerous-substance judging to which it is specified by Fire Service Law (3- Ministerial Ordinance about a trial and description of the 8 and the dangerous substance of the 1st article of the 1st article of the government ordinance about regulation of the dangerous substance). As a result of the alcoholic component in this the "silicon content constituent -1" having been less than [60wt%] (water content: about 57 wt(s)%), and being in a Kitakyushu fire-fighting science laboratory, setting it and measuring the flash point (tag direct vent system) and the burning point (tag unvented system), the flash points were 25.5 degrees C and 31.5 degrees C of burning points. In addition, they are 22.6 degrees C of flash points of 60wt% ethanol water, and 24.7 degrees C of burning points. These results show that this the "silicon content constituent -1" does not correspond to the dangerous substance of Fire Service Law (that to which an alcohol content is less than [60wt%], and the burning point and the flash point exceed the burning point and the flash point of a 60wt% ethanol water solution shall not correspond to the dangerous substance on Fire Service Law).

[0053] (Example 2 of preparation) It is "BYK-301" (trade name.) further to the "silicon content constituent -1" 1000 weight section prepared in the example 1 of preparation. The HAJIKI inhibitor 0.5 weight section made from big KEMI was added, it mixed for 20 minutes at the room temperature, and "the silicon content constituent -2" was prepared.

[0054] It replaces with the "MKC silicate MS 51" used in the example -1 of preparation. (Example -3 of preparation) "ES40" (made in Huels Japan) which is the partial hydrolysis condensate of ethyl silicate is used. Except having adjusted the amount of industrial use ethanol so that SiO_2 in liquid content (conversion) might become 0.8wt(s)% Since "ES40" did not dissolve but liquid became cloudy in the same blending ratio of coal as the example -1 of preparation, when it mixed for 20 minutes at the room temperature, The amount of industrial use ethanol and ion exchange water was adjusted, industrial use ethanol required for ES40 to change with a transparent and colorless homogeneity solution was mixed for 20 minutes at the room temperature by the presentation of a need critical mass, and "the silicon content constituent -3" was prepared. SiO_2 in this liquid A conversion content is 0.8wt%. The blending ratio of coal at this time is shown below.

ES40 100 Weight section (SiO_2 conversion)

8% solution of aluminum system catalysts 1.8 Weight section Industrial use ethanol 8531 Weight section Ion exchange water 4296 Weight section [0055] The industrial use ethanol concentration in this the "silicon content constituent -3" is about 65 wt(s)%, and since an alcohol content is more than 60wt%, it corresponds to the dangerous substance of Fire Service Law. When ethyl silicate is used from this, in the amount of the alcohol for considering as a uniform liquid condition, it turns out that it corresponds to the dangerous substance, and on insurance shows that it is desirable to use methyl silicate.

[0056] (Example 1) The dustcloth was dipped in the "silicon content constituent -2" obtained in the example 2 of preparation, and it extracted lightly by hand, and wiped and applied to the sheathing painted surface of a passenger car. the coverage of a diluent — about 16 g/m² it was .

[0057] (Example 2) It sank into the paper towel and the "silicon content constituent -2" obtained in the example 2 of preparation was saved in the well-closed container, and the front face of the heavy oil tank which is carrying out the finishing paint of ejection and the fluororesin coating (product made from "PF-250 trade-name B" great Japan Color-material Industry) to which dirt has already adhered from the container one month after was rinsed, and was wiped and applied to the field which seasoned naturally. the coverage of "the silicon content constituent -2" — about 50 g/m² it was .

[0058] (Example 3) The "silicon content constituent -2" and LPG (propellants) which were obtained in the example 2 of preparation were filled up with the rate of a capacity factor 100:200 into the aerosol can, and were used as the aerosol constituent. Spray painting of this was carried out to the heavy oil tank like the example 2. the coverage of an aerosol constituent — about 35 g/m² it was .

[0059] (Example 1 of a comparison) It left the part which does not wipe, apply and apply the "silicon content constituent -2" diluent in the example 1.

[0060] (Example 2 of a comparison) It left the part which does not wipe, apply and apply "the silicon content constituent -2" in the example 2. The rear-spring-supporter outdoor exposure of the painted surface of the above, examples 1-3, and the examples 1 and 2 of a comparison was carried out in half a year (June - December, Heisei 10, a location: Sanwa, Sashima-gun, Ibaraki-ken-cho), and visual observation of extent of dirt was carried out. The result is shown in a table 1.

[0061]

[A table 1]

表- 1. 屋外曝露半年後の汚れ状況の観察結果

実施例及び比較例		実施例 1	実施例 2	実施例 3	比較例 1	比較例 2
初期塗膜表面汚れ		無し	無し	無し	無し	無し
半年後の 汚れ状況	ほこり	付着少	付着少	付着少	付着多	付着多
	雨筋	無し	無し	無し	有り	多数有

(Assessment of a dirt situation made "*****" what dirt is clearly accepted in by "*****" and viewing in what dirt is visually accepted in for a while, and estimated what cannot check a rain trace visually as the rain trace "nothing".)

[0062] (Example 3 of a comparison) Except having made the loadings of industrial use ethanol into 80 weight sections, it is the same compounding ratio as the example -2 of preparation, and "the silicon content constituent -4" was prepared. This constituent became cloudy and was not able to be dissolved in homogeneity.

[0063] (Example 4 of a comparison) Except having made the loadings of industrial use ethanol into the 60000 weight sections, it is the same compounding ratio as the example -2 of preparation, and "the silicon content constituent -5" was prepared. The outdoor exposure was performed like the example 1. "In extent of adhesion of dirt, the dirt situation after half a year was "*****", and the rain trace was ** in large numbers."

[0064] (Example 5 of a comparison) Except having made the loadings of water into 70 weight sections, it is the same compounding ratio as the example -2 of preparation, and "the silicon content constituent -6" was prepared. The outdoor exposure was performed like the example 1. "In extent of adhesion of dirt, the dirt situation after half a year was "*****", and the rain trace was ** in large numbers."

[0065] (Example 6 of a comparison) Except having made the loadings of water into the 60000 weight sections, it is the same compounding ratio as the example -2 of preparation, and "the silicon content constituent -7" was prepared. The outdoor exposure was performed like the example 1. "In extent of adhesion of dirt, the dirt situation after half a year was "*****", and the rain trace was ** in large numbers."

[0066]

[Effect of the Invention] It can form a uniform thin film in various structure front faces the top where the method of application using this is simple while its safety at the time of the handling and paint improves, since it shall hold stable liquefied voice and the silicon content constituent of this invention shall not correspond to the dangerous substance on Fire Service Law, stopping the content of a solvent low. Furthermore, the paint film obtained from now on shows the effectiveness excellent in the functional manifestation of resistance to contamination, weatherability, contamination clearance nature, etc.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention prevents the dirt produced in paint or the non-painted surface of a building construction, a soil tree structure object, an industrial device, a traffic sign, etc., such as dust and an oily component, or relates to the liquefied constituent with which adhering dirt is used for a method-of-application list easily removable by the rainfall, wiping, etc. suitable for such paint.

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PRIOR ART

[Description of the Prior Art] In recent years, importance is attached to scene nature, such as a building construction and a soil tree structure object, and various kinds of low stain resistance paint finishing aiming at the contamination-resistant improvement in a structure front face has come to be performed. As the approach of low stain resistance paint finishing, using high weatherability organic system coatings, such as a fluororesin system coating, an acrylic silicon system coating, and an urethane system coating, for finish (top coat) conventionally is performed.

[0003] Moreover, even when it is made hard to adhere dust and an oily pollutant and adheres to these coating systems in recent years by carrying out little addition of the alkyl silicate, and making a paint film front face into a hydrophilic property, what washes away with waterdrop by a rainfall etc. is performed. Development of the inorganic system coating which used as the principal component the organopolysiloxane which was generally excellent in weatherability, endurance, chemical resistance, thermal resistance, etc. on the other hand compared with the above mentioned organic system coating is also prosperous, and there are some which were made commercialization in recent years.

[0004] However, it is the structure etc. when painting such top coat (base material). It is the object which improves adhesion with a paint film more, and it is a problem common to an organic system coating and an inorganic system coating that it is the primer and the method of application with common using an intermediate coat if needed further, and takes time and effort between a base material and top coat. Moreover, lowering of scene nature tends to produce especially the paint film of an organic system coating that it is easy to be polluted in exposure with the effect of sand dust, a metal powder, rain (acid rain etc.), or exhaust gas.

[0005] Moreover, a problem tends to produce viscosity lifting at the time of coating preservation, the crack initiation in a paint film, etc. at paint film physical properties, and the top coat which carried out little addition of the alkyl silicate at these organic system coatings needs caution for handling and paint. Like [coating / inorganic / system] the organic system coating which carried out little addition of the alkyl silicate, the preservation stability of a coating, the crack initiation in a thick film, etc. have many which need heat hardening further, and the actual condition is having problems, like handling and paint taking caution.

[0006] Moreover, since these above-mentioned coating systems contain many volatile organic solvents, they correspond to the dangerous substance of Fire Service Law, and they need caution for dealing with it safely. The actual condition is the above stability of a coating material, a paint film function, and that problem solvings, such as workability at the time of paint and safety, are desired further.

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EFFECT OF THE INVENTION

[Effect of the Invention] It can form a uniform thin film in various structure front faces the top where the method of application using this is simple while its safety at the time of the handling and paint improves, since it shall hold stable liquefied voice and the silicon content constituent of this invention shall not correspond to the dangerous substance on Fire Service Law, stopping the content of a solvent low. Furthermore, the paint film obtained from now on shows the effectiveness excellent in the functional manifestation of resistance to contamination, weatherability, contamination clearance nature, etc.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] This invention does not need under coat paint, but only paints it on the direct or existing paint film on structure front faces, such as a building construction and a soil tree structure object, and aims at offering the coating material and the method of application which may improve paint film functions, such as resistance to contamination and weatherability.

[Translation done.]

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MEANS

[Means for Solving the Problem] As a result of repeating examination wholeheartedly in view of the above-mentioned technical problem, this invention persons A building construction, a soil tree structure object, On paint of an industrial device, a transport-airplane machine, a traffic sign, etc., or the front face of the non-painting structure the specific silicon content constituent shown below — paper, cloth, a nonwoven fabric, etc. — sinking in — wiping — applying — or this silicon content constituent — aerosol — izing — the fuel spray and the paint film applied and obtained — dirt — prevention — or — even if a contamination should adhere — clearance — the easy thing was resulted in a header and this invention.

[0009] Namely, this invention (1) The method of application which applies the silicon content liquefied constituent which comes to blend following component (A) — (D) on the surface of the structure, and prevents the dirt on the front face of the structure, (Component A) ORGANO silicate SiO_2 By conversion, the 100 weight sections A component (B) catalyst 0.1 — 10 weight section Component (C) water The 100 — 50000 weight section A component (D) solvent 100 — 50000 weight section (2) The method of application which applies the silicon content liquefied constituent which comes to blend following component (A) — (E) on the surface of the structure, and prevents the dirt on the front face of the structure (Component A) ORGANO silicate SiO_2 By conversion, the 100 weight sections Component (B) catalyst 0.1 — 10 weight section Component (C) water 100 — 50000 weight section Component (D) solvent 100 — 50000 weight section They are one or more sorts [0010] in a component (E) pigment, a filler, and the additive for coatings. (3) Component (A) the silicon content liquefied constituent which comes to blend — (D) The method of application given in the above (1) which aerosol-izes and applies by spraying this on the surface of the structure, (4) Component (A) the silicon content liquefied constituent which comes to blend — (E) The method of application given in the above (2) which aerosol-izes and applies by spraying this on the surface of the structure, (5) Above-mentioned (1) — (4) whose component (A) is what is expressed with rational-formula SiO_x (OR) y is the method of application (however, it is $0 \leq x \leq 1.2$ and $1.4 \leq y \leq 4$, and R is the alkyl group of carbon numbers 1-4, and is $2 \times y = 4$.) of a publication either, (6) The method of application given in either of above-mentioned (1) — (5) whose ORGANO silicate is methyl silicate, [0011] (7) The silicon content liquefied constituent which comes to blend following component (A) — (D), (Component A) ORGANO silicate SiO_2 By conversion, the 100 weight sections A component (B) catalyst 0.1 — 10 weight section Component (C) water The 100 — 50000 weight section A component (D) solvent 100 — 50000 weight section (8) The silicon content liquefied constituent which comes to blend following component (A) — (E) on the surface of the structure, (Component A) ORGANO silicate SiO_2 By conversion, the 100 weight sections Component (B) catalyst 0.1 — 10 weight section Component (C) water 100 — 50000 weight section Component (D) solvent 100 — 50000 weight section They are one or more sorts [0012] in a component (E) pigment, a filler, and the additive for coatings. (9) The above (7) whose component (A) is what is expressed with rational-formula SiO_x (OR) y, or a silicon content liquefied constituent given in (8) (however, it is $0 \leq x \leq 1.2$ and $1.4 \leq y \leq 4$, and R is the alkyl group of carbon numbers 1-4, and is $2 \times y = 4$.), (10) ORGANO silicate consists in a silicon content liquefied constituent given in either of above-mentioned (7) — (9) which is methyl silicate.

[0013] It applied to the non-painting structure front face directly, or it became possible only by painting a specific silicon content liquefied constituent on the existing paint film on the painted front face of the structure by this invention to raise paint film functions, such as resistance to contamination and weatherability. A paint film function can also be further improved by having blended various additives for coatings, such as a pigment, a bulking agent and/or a dripping inhibitor, a leveling agent, a HAJIKI inhibitor, an adhesion improver, a seaweed-proofing agent, an antimicrobial agent, a deodorizer, and an ultraviolet ray absorbent, etc. especially as a silicon content liquefied constituent.

[0014]

[Embodiment of the Invention] In this invention, component (A) — (D) explained below or the thing which blended the component (E) further and was used as the liquefied constituent is used. A component (A) is the compound which the organic radical combined with ORGANO silicate, i.e., a silicon atom, through the oxygen atom first. ORGANO KISHISHIRAN which four organic radicals combined with one silicon atom through the oxygen atom as ORGANO silicate, and the ORUGANOKISHI siloxane in which silicon forms the siloxane principal chain (Si-O) (n) are mentioned.

[0015] especially the organic radical combined with silicon through an oxygen atom is limited — not having — for example, the shape of a straight chain, the letter of branching, or an annular alkyl group — methyl, ethyl, n-propyl, i-propyl, n-butyl, i-butyl, t-butyl, n-pentyl, i-pentyl, neopentyl one, hexyl, an octyl radical, etc. are more specifically mentioned, and especially the alkyl group of carbon numbers 1-4 is suitable. As other organic radicals, an aryl group, a xylyl group, a naphthyl group, etc. are mentioned. Moreover, you may have two or more sorts of radicals which are different from each other as an organic radical.

[0016] As an alkyl group, although the thing of carbon numbers 1-4 is desirable, it is any of the shape of a straight chain, and the letter of branching, and a peach is good, for example, a methyl group, an ethyl group, n-propyl group, i-propyl group, n-butyl, i-butyl, sec-butyl, t-butyl, etc. are mentioned, and the complex and/or mixture of these radicals can also be used. You may have two or more sorts of alkyl groups which are different from each other as an alkyl group. A field to the methyl group and/or ethyl group of the solubility at the time of considering as the silicon content constituent of this invention among these alkyl groups and the manifestation nature of the low stain resistance function of the paint film obtained are desirable, and a methyl group is the most desirable.

[0017] In the case of an alkyl group to which a carbon number exceeds 4, when considering as the silicon content constituent of this invention, since solubility is low, an organic solvent is needed for a large quantity, and the problem on handling, such as corresponding to the dangerous substance of Fire Service Law, occurs in many cases. Moreover,

the alkyl group to which a carbon number exceeds 4 is lacking in hydrolysis nature, generation of the SiOH radical in the outdoor exposure of the paint film obtained becomes it is remarkable and slow, and a scarce inclination is in the manifestation nature of a low stain resistance function.

[0018] As ORGANO KISHISHIRAN, a tetramethoxy silane, a tetra-ethoxy silane, tetra-propoxysilane, tetra-butoxysilane, a tetra-phenoxy silane, dimethoxy diethoxysilane, etc. are mentioned, for example. The condensate of above-mentioned ORGANO KISHISHIRAN is mentioned as an ORUGANOKISHI siloxane. Although especially whenever [condensation] is not limited, what is shown by the following rational formulas as desirable range is mentioned.

[0019] $\text{SiO}_x(\text{OR})_y$ (it is $0 \leq x \leq 1.2$ and $1.4 \leq y \leq 4$ among a formula, and R is an organic radical.) R is the alkyl group of carbon numbers 1-4 preferably. However, it is $2 \leq x+y=4$.

[0020] Although a multiplier x shows whenever [condensation / of a siloxane], when a siloxane has molecular weight distribution, it means whenever [average condensation]. $x=0$ expresses ORGANO KISHISHIRAN which is a monomer, and $0 < x < 2$ corresponds to the oligomer which is a condensate exceeding the monomer obtained by carrying out partial hydrolysis condensation of this. $x=2$ corresponds to SiO_2 (silica). Whenever [condensation / of the ORGANO silicate used by this invention], the range of x of $0 \leq x \leq 1.2$ is desirable, and it is $0 \leq x \leq 1.0$ more preferably. Moreover, a siloxane principal chain may not ask the shape of a straight chain, branching, and annular, and may be such mixture.

[0021] Whenever [condensation] is the amount of macromolecules highly, and since it is lacking in stability, the ORGANO silicate of $x > 1.2$ is [that it is easy to gel viscosity highly at the time of storage] difficult to use it. Moreover, since the solubility to an organic solvent is low, it is easy to generate the problem on handling — in case the silicon content constituent of this invention is prepared, need an organic solvent for a large quantity, and the constituent obtained corresponds to the dangerous substance of Fire Service Law.

[0022] In addition, a rational formula $\text{SiO}_x(\text{OR})_y$ can be searched for by the following approaches. Whenever condensation: x can be easily known by measuring Si-NMR. the chemical shift value of a tetramethylsilane (primary standard) — 0 ppm — carrying out — the case of ORGANO silicate — between a chemical shift value and -75—120ppm — the peak of five groups — giving — respectively — Q0, Q1, Q2, Q3, and Q4 — it calls. Each peak originates in the number of siloxane association which a silicon atom has, and is Q0. The number of siloxane association is the monomer of 0, and Q1. The number of siloxane association is one and Q2. The number of siloxanes is two and Q3. The number of siloxane association is three and Q4. The number of siloxane association expresses four objects. :x can be found whenever [condensation] by asking for the surface ratio of each of these peaks, and calculating according to the following formulas. In the case of a silica (SiO_2), it is set to $x=2$. $x = \text{Ax}0 + \text{Bx}0.5 + \text{Cx}1.0 + \text{Dx}1.5 + \text{Ex}2$ Q0, Q1, Q2, Q3, and Q4 Each surface ratio is made into A:B:C:D:E. However, it is $\text{A} + \text{B} + \text{C} + \text{D} + \text{E} = 1$. The multiplier y in a rational formula is called for from $2 \leq x+y=4$. in addition — as an organic radical — difference — when it has two or more sorts of radicals and calculates the amount of association of each organic radical, it can ask easily from H-NMR or ^{13}C -NMR. In this case, identification of a chemical shift should just choose an easy approach suitably.

[0023] As a desirable example of the ORGANO silicate used by above-mentioned this invention, a tetramethoxy silane, a tetra-ethoxy silane, tetra-n-propoxysilane, tetra-isopropoxysilane, tetra-n-butoxysilane, tetrapod iso butoxysilane, tetra-sec-butoxysilane, tetra-t-butoxysilane, and/or these partial hydrolysis condensates are mentioned, for example. These things can also use one sort or the thing combined two or more sorts. Since there is little organic solvent **** used for preparing a uniform liquefied constituent, and it ends among these ORGANO silicate from a tetramethoxy silane and/or this partial hydrolysis condensate being high, and hydrolysis reactivity tending to generate a silanol group, and it does not correspond to the dangerous substance but the pollution-control effectiveness can obtain a high constituent easily, it is suitable in order to raise especially safety.

[0024] In addition, although the organic radical is combined with silicon through oxygen in ORGANO silicate, in the silicon content constituent of this invention, organic silicon compounds other than ORGANO silicate, for example, the silicon compound which has the organic radical coupled directly through silicon, may be included. As such a compound, various kinds of silane coupling agents etc., for example more specifically Methyl trimethoxysilane, methyl triethoxysilane, a methyl tripropoxy silane, A methyl triisopropoxy silane, ethyltrimethoxysilane, ethyltriethoxysilane, An ethyl tripropoxy silane, an ethyl triisopropoxy silane, propyltrimethoxysilane, Propyl triethoxysilane, butyltrimethoxysilane, epoxybutyltriethoxysilane, Pentyl trimethoxysilane, pentyl triethoxysilane, hexyl trimethoxysilane, Hexyl triethoxysilane, phenyltrimethoxysilane, phenyltriethoxysilane, A phenyl tripropoxy silane, a phenyl triisopropoxy silane, Benzyl trimethoxysilane, benzyl triethoxysilane, 3-glycidoxypropyltrimethoxysilane, 3-glycidoxypropyltriethoxysilane, 2-(3, 4-epoxycyclohexyl) ethyltriethoxysilane, 2-(3, 4-epoxycyclohexyl) ethyltriethoxysilane, 3-methacryloxy propyl trimethoxysilane, 3-methacryloxypropyl triethoxysilane, Vinyltrimethoxysilane, vinyltriethoxysilane, 3-mercapto propyltrimethoxysilane, 3-mercapto propyl triethoxysilane, 3-aminopropyl triethoxysilane, Trialkoxysilane compounds, such as N-(2-aminoethyl)-3-aminopropyl trimethoxysilane and 3-ureido propyl triethoxysilane, and these partial hydrolysis condensates are mentioned.

[0025] Furthermore, dialkoxysilane compounds, such as dimethyldimethoxysilane, dimethyl diethoxysilane, diethyldimethoxysilane, diethyldiethoxysilane, diphenyldimethoxysilane, diphenyl diethoxysilane, 3-glycidoxypropylmethyl dimethoxysilane, 3-methacryloxy propyl methyl dimethoxysilane, 3-mercapto propylmethyl dimethoxysilane, 3-aminopropyl methyl JITOKISHI silane, and N-(2-aminoethyl)-3-aminopropyl methyl dimethoxysilane, and these partial hydrolysis condensates are mentioned.

[0026] Furthermore, chlorosilane compounds, such as methyltrichlorosilane, vinyl trichlorosilane, phenyl trichlorosilane, methyl dichlorosilane, dimethyldichlorosilane, dimethyl chlorosilane, methylvinyl dichlorosilane, 3-chloropropyl methyl dichlorosilane, diphenyl dichlorosilane, and methylphenyl dichlorosilane, and these partial hydrolysis condensates are mentioned.

[0027] Furthermore, 3-mercapto propyltrimethoxysilane, 3-mercapto propylmethyl dimethoxysilane, 3-mercapto propyl triethoxysilane, 3-mercapto propylmethyl diethoxysilane, 3-aminopropyl trimethoxysilane, 3-aminopropyl triethoxysilane, N-3-trimethoxysilylpropyl-m-phenylenediamine, N, and N-bis[3-(methyl dimethoxy silyl) propyl] ethylenediamine, N and N-bis[3-(trimethoxysilyl) propyl] ethylenediamine, N-(2-aminoethyl)-3-aminopropyl methyl dimethoxysilane, N-(2-aminoethyl)-3-aminopropyl trimethoxysilane, P-[N-(2-aminoethyl) aminomethyl] phenethyl trimethoxysilane, etc. are mentioned.

[0028] It is ORGANO silicate which is the (A) component in this case although these organic silicon compounds may be included in the silicon content constituent of this invention SiO_2 It carries out to below 10 weight sections more

preferably below 25 weight sections to the 100 weight sections by conversion. Organic silicon compounds other than such ORGANO silicate are because there are few amounts of functional groups which can be hydrolyzed as compared with ORGANO silicate, and the degree which contributes to a pollution control is remarkable and low. Of course, such a compound does not need to be included at all. Moreover, although the silicon compound in which the functional group in which the hydrolysis of those other than an ORUGANOKISHI radical is possible, for example, various kinds of halogens etc., was made to exist may be made to exist, since hydrolysis may generate the matter with the difficult handling of a hydrochloric acid etc., many are ORGANO silicate desirably on an environment SiO_2 It carries out to below 10 weight sections more preferably below 20 weight sections to the 100 weight sections by conversion. Of course, such a compound does not need to be included at all.

[0029] A component (B) is a catalyst and what has a hydrolysis operation of ORGANO silicate is mentioned. They are more specifically inorganic acids, such as a hydrochloric acid, a sulfuric acid, a nitric acid, and a phosphoric acid. Organic acids, such as an acetic acid, benzenesulfonic acid, toluenesulfonic acid, a xylene sulfonic acid, an ethylbenzene sulfonic acid, a benzoic acid, a phthalic acid, a maleic acid, a formic acid, and oxalic acid. Alkali catalysts, such as a sodium hydroxide, a potassium hydroxide, a calcium hydroxide, ammonia, and an organic amine compound. Organotin compounds, such as dibutyltin dilaurate, dibutyltin JIOKUCHIETO, and dibutyltin diacetate. Aluminum tris (acetylacetonate), an aluminum monoacetyl acetonate screw (ethyl acetoacetate), Organoaluminum compounds, such as aluminum tris (ethyl acetoacetate) and ethyl acetoacetate aluminum JIISOPUROIPIRETO, Titanium tetrakis (acetylacetonate), a titanium bis(butoxy) screw (acetylacetonate), Organic titanium compounds, such as titanium tetra-n-butoxide, zirconium tetrakis (cetyl acetonate), A zirconium bis(butoxy) screw (acetylacetonate) and a zirconium (isopropoxy) screw (acetylacetonate), The organometallic compound or metal alkoxide compounds other than ORGANO silicate, such as organic zirconium compounds, such as zirconium tetra-n-butoxide. Boron compounds, such as BORONTORI n-butoxide and a boric acid, etc. are mentioned.

[0030] One sort or the thing combined two or more sorts can also be used for these catalysts. When applying the silicon content constituent of this invention to paint of a building construction, a soil tree structure object, an industrial device, a transport-airplane machine, a traffic sign, etc., or the front face of the non-painting structure, from the point of the corrosion prevention of the base material by these catalysts, it is desirable to use an organic metal chelate compound or a metal alkoxide compound.

[0031] The addition of a catalyst is the amount of Si in ORGANO silicate SiO_2 It converts and is 0.1 - 10 weight section to the 100 weight sections. It is 0.5 - 5 weight section more preferably. When the amount of catalysts considers as the silicon content constituent of this invention under in the 0.1 weight section, it is lacking in the manifestation nature of the low stain resistance function of the paint film which lowering of the storage stability of a constituent arises or is obtained. Moreover, 0.1 - 10 weight section is enough as the addition of a catalyst from the storage stability of a silicon content constituent, and the manifestation nature of a paint film function, and it is unnecessary in the superfluous addition exceeding 10 weight sections. It may dissolve in ORGANO silicate and the addition approach of a catalyst may be used as mixed liquor, and even if it dissolves and uses for water or a solvent, it does not interfere. That what is necessary is to mix with ORGANO silicate and/or water, or a solvent, and just to dissolve under a room temperature on the occasion of the dissolution, as long as it is hard to dissolve under a room temperature, you may warm.

[0032] The loadings of the water which is Component C are the amount of Si in ORGANO silicate SiO_2 It converts and is the 100 - 50000 weight section to the 100 weight sections. It considers as the range of the 500 - 10000 weight section preferably. the theory which may hydrolyze the ORUGANOKISHI radical on which ORGANO silicate generally has this — the water of the amount of an overlarge will be blended rather than amount of water, by this, the silanol group generated by hydrolysis of ORGANO silicate is made to coexist with a lot of water, the condensation reaction of a silanol group is controlled, and it is thought that improvement in the storage stability of hydrolysis liquid is attained. Simultaneously, it becomes possible to be able to lower the blending ratio of coal of organic solvents, such as alcohol as a constituent, and to stop the flash point and the burning point low, and the safety on an activity improves greatly.

[0033] The addition of water is the amount of Si in ORGANO silicate SiO_2 When Si content in the silicon content constituent which converts and is obtained the case of under the 100 weight sections to the 100 weight sections becomes high too much, it is easy to gel at the time of preservation and storage stability poses a problem from the field of practicability, the pollution-control effectiveness is also low. There are too few Si contents in the silicon content constituent obtained on the other hand if the 50000 weight sections are exceeded, and the manifestation nature of the low stain resistance function when making it a paint film is scarce.

[0034] What is necessary is just to choose suitably, since it is sometimes desirable to use deionized water and ultrapure water depending on the object and an application although especially a limit may not be in the water used by this invention and tap water is sufficient. For example, when using for electrical and electric equipment, such as base materials, such as mild steel which is easy to corrode especially with an acid, copper, and aluminum, a heat-resistant coat, a damp-proof coat, a chemical-resistant coat, a barrier property-proof coat, and an electric insulation coat, and an electronic ingredient application, desalted water can be used, or like the application of a semi-conductor etc., when mixing of an impurity is not desirable, ultrapure water can be used.

[0035] Especially the solvent of Component D is not limited. Generally one sort or two sorts or more in various kinds of organic solvents, for example, alcohols, or a glycol derivative, hydrocarbons, ester, ketones, and ether can be mixed and used. As alcohols, a methanol, ethanol, n-propanol, isopropanol, n-butanol, isobutanol, acetylacetone alcohol, etc. are mentioned.

[0036] As a glycol derivative, for example, ethylene glycol, ethylene glycol monomethyl ether, Ethylene glycol monoethyl ether, propylene glycol, propylene glycol monomethyl ether, The propylene glycol monoethyl ether, the diethylene-glycol monomethyl ether, Diethylene glycol monoethyl ether, ethylene glycol monomethyl ether acetate, Ethylene glycol monoethyl ether acetate, propylene-glycol-monomethyl-ether acetate, propylene glycol monoethyl ether acetate, etc. are mentioned.

[0037] Benzene, toluene, a xylene, kerosine, n-hexane, etc. can be used as hydrocarbons, and methyl acetate, ethyl acetate, propyl acetate, butyl acetate, methyl acetoacetate, an ethyl acetoacetate, butyl acetoacetate, etc. can be used as ester. Moreover, as ketones, an acetone, a methyl ethyl ketone, methyl isobutyl ketone, an acetylacetone, etc. can be used, and ethyl ether, butyl ether, methoxy ethanol, ethoxy ethanol, dioxane, a furan, a tetrahydrofuran, etc. can be used as ether. It is desirable from the field of the manifestation nature of the low stain resistance function of the paint film obtained among these solvents while the storage stability at the time of the methanol of C1-C3, ethanol,

isopropanol, the propylene glycol monomethyl ether of a glycol derivative, and diethylene glycol monoethyl ether being especially easy for handling, and considering as the silicon content constituent of this invention of alcohols is good. [0038] The addition of a solvent is the amount of Si in ORGANO silicate SiO_2 . It converts and considers as the 100 - 50000 weight section to the 100 weight sections. It sets up in the range of the 500 - 10000 weight section more preferably. The addition of an organic solvent is the amount of Si in ORGANO silicate SiO_2 . It converts and the homogeneity dissolution of ORGANO silicate, a catalyst, and water becomes difficult the case of under the 100 weight sections to the 100 weight sections. While the manifestation nature of a low stain resistance function when there are too few Si contents in the silicon content constituent obtained on the other hand if the 50000 weight sections are exceeded and they make it a paint film is scarce, it corresponds to the dangerous substance of Fire Service Law, and the problem on handling is produced. In addition, the amount of a solvent also including the alcohol which ORGANO silicate hydrolyzed and generated shows the above.

[0039] (The combination approach of a silicon content constituent) As for the combination approach of the silicon content constituent of this invention, it is [that what is necessary is to be presentation within the limits of this invention, and just to carry out homogeneity mixing of the component (A) mentioned above, (B), (C), and the (D)] desirable to become transparent liquid, and especially the temperature and the mixed approach at the time of combination are not limited. Room temperature extent is especially enough and it is not necessary to heat. For example, using mixed containers, such as a mixing chamber, a mixed iron pot or a mixer, a drum, and an oil can, component (A) - (D) is serially taught under a room temperature, mixed actuation of stirring or a revolution, reversal, an oscillation, etc. is performed, and it is good also as a silicon content constituent transparent 1 liquid type [uniform]. Moreover, it is good also as a silicon content constituent used as a combination gestalt of the 2 liquid type which divides into base resin and a curing agent, and mixes and uses base resin and a curing agent before an activity, for example, good in base resin also considering alkyl silicate, the mixture of a catalyst, and a curing agent as mixture of water and an organic solvent in using base resin as alkyl silicate and using a curing agent as the mixture of a catalyst, water, and an organic solvent. A these 2 liquid type gestalt is not limited to the above-mentioned thing which carried out the account of an example.

[0040] In this invention, pigments, such as a color pigment which can be blended with the usual coating as a component (E), and an extender, a filler, and various kinds of other additives can be blended. What is necessary is just to choose especially an addition suitably with extent which is not limited and generally does not influence the effectiveness of this invention. As an additive of a component (E), organic pigments, such as inorganic system pigments, such as titanium oxide, a zinc oxide, carbon black, ferric oxide (red ochre), a lead chromate, the chrome yellow, Synthetic Ochre, ochre, ultramarine blue, and cobalt green, an azo system, a naphthol system, a pyrazolone system, an anthraquinone system, a perylene system, the Quinacridone system, a JISUAZO system, an isoindolinone system, a benzimidazole system, a phthalocyanine system, and a kino FUTARON system, etc. are mentioned with a color pigment, for example. Moreover, it is also possible to use extenders, such as whiting, clay, a kaolin, talc, precipitated barium sulphate, a barium carbonate, white carbon, and diatomaceous earth.

[0041] As various additives, it is still more possible a pigment agent, a sedimentation inhibitor, and to hang down and for an inhibitor, a flattening agent, a plasticizer, a defoaming agent, a leveling agent, a HAJIKI inhibitor, an adhesion improver, antiseptics, a seaweed-proofing agent, an antimicrobial agent, a deodorizer, an ultraviolet ray absorbent, etc. to be mentioned, and to use it, carrying out little addition. although there will be especially no limit if the loadings of these additives are an addition which the effectiveness of the additive made into the object discovers — the silicon content constituent 100 weight section of this invention — receiving — the 0.01 - 10.0 weight section — it comes out enough with the addition of the 0.01 - 1.0 weight section preferably.

[0042] the combination approach of a component (E) is limited — not having — component (A) - (D) — all may be blended, and you may add to the silicon content constituent liquefied one time, and may add and use for each components, such as alkyl silicate which dissolves or is easy to distribute, water, and an organic solvent. Moreover, it divides into base resin and a curing agent, and in the case of the silicon content constituent used as a combination gestalt of the 2 liquid type which mixes and uses base resin and a curing agent before an activity, it blends for any of base resin or a curing agent being, and it should just use a component (E).

[0043] Each above component can be blended and the silicon content constituent of this invention can be obtained. The concentration of the ORGANO silicate in this silicon content constituent is the amount of Si in ORGANO silicate SiO_2 . It converts and 0.05 - 15 % of the weight is 0.1 - 10 % of the weight desirable still more preferably. The concentration of ORGANO silicate is SiO_2 . The manifestation nature of the low stain resistance function at the time of the concentration being low and applying to paint of a building construction, a soil tree structure object, an industrial device, a transport-airplane machine, a traffic sign, etc. or the front face of the non-painting structure at less than 0.05 % of the weight, with conversion concentration, is scarce. On the other hand, the concentration of alkyl silicate is SiO_2 . Since the concentration of what exceeds 15 % of the weight by conversion concentration is high, a silicon content constituent tends to gel it at the time of preservation, and it is in the inclination for storage stability to pose a problem from the field of practicability.

[0044] (Method of application) It is possible to wipe [sink it in and] and apply the silicon content constituent of this invention to paper, cloth, a nonwoven fabric, etc., or to aerosol-ize it on a paint front face or non-painting front faces, such as a building construction, a soil tree structure object, an industrial device, a transport-airplane machine, and a traffic sign, and to apply by simple approaches, such as fuel-spray spreading. It is also possible to apply, of course by various approaches, such as the usual brush coating, roller coating, spray coating, a roll coater, and a flow coater.

[0045] the structures set as the spreading object of the silicon content constituent of this invention be the outdoor structures, such as transport airplane machines, such as cultural properties, such as building constructions, such as soil tree structure objects, such as a tunnel, a dam, a bridge, a tank, and a chimney stack, a residence, and a building, a temple, a shrine, a stone image, and ruins, an automobile, an aircraft, a rail car, and a marine vessel, an industrial device, a traffic sign, and a guard rail, and be the structure which have perform the existing paint to these, or the non-paint structure as a concrete spreading side — for example — the wall surface of the exterior of said structure and the inner surface (an outer wall, wall), the bath of a building construction, and a galley — further — dirt, such as tank sides, such as furniture, a refrigerator, television, and an air-conditioner, and a windowpane, — being easy — a location is mentioned. In addition, the location which can apply the silicon content constituent of this invention is usable not only in the location which carried out the account of an example but various locations because of dirt prevention.

[0046] The 1st approach of the simple method of application of this invention is the approach of paper, cloth, a nonwoven fabric, etc. sinking the silicon content constituent of this invention into the medium which can sink in the silicon content liquefied constituent of this invention, extracting this moderately if needed, and wiping, applying and using as a paint object front face. Moreover, the 2nd approach aerosol-izes the silicon content constituent of this invention, and is the fuel spray and the approach of applying on a structure front face.

[0047] Either the approach of making carry out impregnation of the silicon content constituent of this invention to paper, cloth, a nonwoven fabric, etc. beforehand, saving it in the well-closed container by the 1st approach, taking out from a container if needed, and wiping, applying and carrying out a structure front face or the approach of dipping paper, cloth, a nonwoven fabric, etc. in the silicon content constituent of this invention at the time of an activity, extracting moderately, wiping a structure front face, applying, and carrying out is possible. By a structure front face being able to apply an established paint film or un-painting simply also by the new paint film, and wiping with this approach, since it is coating, dripping is not produced. Moreover, since the dirt which wiped, and applied, simultaneously has already adhered can be wiped off, even if it does not wash a structure front face beforehand, it can apply.

[0048] With propellants, the silicon content constituent of this invention is filled up with the 2nd approach into an aerosol can, and is aerosol-ized by it. it is possible to use well-known propellants as propellants, for example, independent in wood ether, LP gas, etc. — or it can be mixed and used. This aerosol ghost can be used for the same structure front face as the 1st approach, and that method of application can paint a direct aerosol ghost easily by carrying out fuel-spray spreading on a structure front face. In addition, when carrying out fuel-spray spreading of the aerosol ghost on the paint film front face of the established structure and non-painting object front face to which dirt has already adhered, pretreatment of washing a front face beforehand and removing dirt is desirable. It is possible to, carry out fuel-spray spreading of the direct aerosol ghost on the other hand, without washing, when there is no adhesion of dirt like structure front faces, such as a new construction paint film and touch-up film, or the non-painting new construction structure. In this case, even if it has not dried a new construction paint film, the touch-up film, or a non-painting new construction structure front face, it is possible to carry out fuel-spray spreading of the aerosol ghost.

[0049] Thus, the thin film formation which may improve paint film functions which present the good paint result which applies to various structure front faces and does not have nonuniformity, dripping, a crack, etc. by the simple method of application using the silicon content constituent of this invention, such as resistance to contamination and weatherability, is attained. The silicon content liquefied constituent of this invention explained above is possible also for holding down the amount of organic solvents, such as alcohol, to the top which can be saved by liquefied voice at stability, and not corresponding to the dangerous substance on Fire Service Law in it, either, and desirable also from a viewpoint of the insurance on an activity. This is considered because the balance of the quantitative ratio of each combination component is kept good.

[Translation done.]

* NOTICES *

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EXAMPLE

[Example] Hereafter, an example explains this invention to a detail further. In addition, especially, % shows weight %, as long as there is no notice.

[0051] (Example 1 of preparation) Using the partial hydrolysis condensate (Mitsubishi Chemical make: trade name "MKC silicate MS 51" rational-formula: $\text{SiO}_2 \cdot 0.8 \cdot 2.4 (\text{OCH}_3)$) of methyl silicate, it mixed for room temperature 20 minutes by the following blending ratio of coal, and the "silicon content constituent -1" of transparent and colorless liquid was prepared.

MS51 100 Weight section (SiO_2 conversion)

8% solution of aluminum system catalysts 1.8 Weight section Industrial use ethanol 5385 Weight section Ion exchange water 7500 SiO_2 in the liquid of weight **** A conversion content is 0.8wt%.

[0052] The dangerous-substance judging of this the "silicon content constituent -1" was performed according to the test method for the dangerous-substance judging to which it is specified by Fire Service Law (3- Ministerial Ordinance about a trial and description of the 8 and the dangerous substance of the 1st article of the 1st article of the government ordinance about regulation of the dangerous substance). As a result of the alcoholic component in this the "silicon content constituent -1" having been less than [60wt%] (water content: about 57 wt(s)%), and being in a Kitakyushu fire-fighting science laboratory, setting it and measuring the flash point (tag direct vent system) and the burning point (tag unvented system), the flash points were 25.5 degrees C and 31.5 degrees C of burning points. In addition, they are 22.6 degrees C of flash points of 60wt% ethanol water, and 24.7 degrees C of burning points. These results show that this the "silicon content constituent -1" does not correspond to the dangerous substance of Fire Service Law (that to which an alcohol content is less than [60wt%]; and the burning point and the flash point exceed the burning point and the flash point of a 60wt% ethanol water solution shall not correspond to the dangerous substance on Fire Service Law).

[0053] (Example 2 of preparation) It is "BYK-301" (trade name,) further to the "silicon content constituent -1" 1000 weight section prepared in the example 1 of preparation. The HAJIKI inhibitor 0.5 weight section made from big KEMI was added, it mixed for 20 minutes at the room temperature, and "the silicon content constituent -2" was prepared.

[0054] It replaces with the "MKC silicate MS 51" used in the example -1 of preparation. (Example -3 of preparation) "ES40" (made in Huels Japan) which is the partial hydrolysis condensate of ethyl silicate is used. Except having adjusted the amount of industrial use ethanol so that SiO_2 in liquid content (conversion) might become 0.8wt(s)% Since "ES40" did not dissolve but liquid became cloudy in the same blending ratio of coal as the example -1 of preparation, when it mixed for 20 minutes at the room temperature, The amount of industrial use ethanol and ion exchange water was adjusted, industrial use ethanol required for ES40 to change with a transparent and colorless homogeneity solution was mixed for 20 minutes at the room temperature by the presentation of a need critical mass, and "the silicon content constituent -3" was prepared. SiO_2 in this liquid A conversion content is 0.8wt%. The blending ratio of coal at this time is shown below.

ES40 100 Weight section (SiO_2 conversion)

8% solution of aluminum system catalysts 1.8 Weight section Industrial use ethanol 8531 Weight section Ion exchange water 4296 Weight section [0055] The industrial use ethanol concentration in this the "silicon content constituent -3" is about 65 wt(s)%, and since an alcohol content is more than 60wt%, it corresponds to the dangerous substance of Fire Service Law. When ethyl silicate is used from this, in the amount of the alcohol for considering as a uniform liquid condition, it turns out that it corresponds to the dangerous substance, and on insurance shows that it is desirable to use methyl silicate.

[0056] (Example 1) The dustcloth was dipped in the "silicon content constituent -2" obtained in the example 2 of preparation, and it extracted lightly by hand, and wiped and applied to the sheathing painted surface of a passenger car. the coverage of a diluent — about 16 g/m² it was .

[0057] (Example 2) It sank into the paper towel and the "silicon content constituent -2" obtained in the example 2 of preparation was saved in the well-closed container, and the front face of the heavy oil tank which is carrying out the finishing paint of ejection and the fluororesin coating (product made from "PF-250 trade-name B" great Japan Color-material Industry) to which dirt has already adhered from the container one month after was rinsed, and was wiped and applied to the field which seasoned naturally. the coverage of "the silicon content constituent -2" — about 50 g/m² it was .

[0058] (Example 3) The "silicon content constituent -2" and LPG (propellants) which were obtained in the example 2 of preparation were filled up with the rate of a capacity factor 100:200 into the aerosol can, and were used as the aerosol constituent. Spray painting of this was carried out to the heavy oil tank like the example 2. the coverage of an aerosol constituent — about 35 g/m² it was .

[0059] (Example 1 of a comparison) It left the part which does not wipe, apply and apply the "silicon content constituent -2" diluent in the example 1.

[0060] (Example 2 of a comparison) It left the part which does not wipe, apply and apply "the silicon content constituent -2" in the example 2. The rear-spring-supporter outdoor exposure of the painted surface of the above, examples 1-3, and the examples 1 and 2 of a comparison was carried out in half a year (June - December, Heisei 10, a location: Sanwa, Sashima-gun, Ibaraki-ken-cho), and visual observation of extent of dirt was carried out. The result is shown in a table 1.

[0061]

[A table 1]

表- 1. 屋外曝露半年後の汚れ状況の観察結果

実施例及び比較例		実施例 1	実施例 2	実施例 3	比較例 1	比較例 2
初期塗膜表面汚れ		無し	無し	無し	無し	無し
半年後の	ほこり	付着少	付着少	付着少	付着多	付着多
	汚れ状況	無し	無し	無し	有り	多数有

(Assessment of a dirt situation made "*****" what dirt is clearly accepted in by "*****" and viewing in what dirt is visually accepted in for a while, and estimated what cannot check a rain trace visually as the rain trace "nothing".)

[0062] (Example 3 of a comparison) Except having made the loadings of industrial use ethanol into 80 weight sections, it is the same compounding ratio as the example -2 of preparation, and "the silicon content constituent -4" was prepared. This constituent became cloudy and was not able to be dissolved in homogeneity.

[0063] (Example 4 of a comparison) Except having made the loadings of industrial use ethanol into the 60000 weight sections, it is the same compounding ratio as the example -2 of preparation, and "the silicon content constituent -5" was prepared. The outdoor exposure was performed like the example 1. "In extent of adhesion of dirt, the dirt situation after half a year was "*****", and the rain trace was ** in large numbers."

[0064] (Example 5 of a comparison) Except having made the loadings of water into 70 weight sections, it is the same compounding ratio as the example -2 of preparation, and "the silicon content constituent -6" was prepared. The outdoor exposure was performed like the example 1. "In extent of adhesion of dirt, the dirt situation after half a year was "*****", and the rain trace was ** in large numbers."

[0065] (Example 6 of a comparison) Except having made the loadings of water into the 60000 weight sections, it is the same compounding ratio as the example -2 of preparation, and "the silicon content constituent -7" was prepared. The outdoor exposure was performed like the example 1. "In extent of adhesion of dirt, the dirt situation after half a year was "*****", and the rain trace was ** in large numbers."

[Translation done.]